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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,000	02/22/2002	Kazuo Ohnishi	134.140	1725

7590 06/17/2003

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EXAMINER

NGUYEN, HANH N

ART UNIT PAPER NUMBER

2834

DATE MAILED: 06/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/082,000	OHNISHI ET AL.	
	Examiner	Art Unit	
	Nguyen N Hanh	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 February 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. In view of amendments, the Examiner withdraws the objection to the drawings, the addition of claims 9-12 has been acknowledged.

Specification

2. The disclosure is objected to because of the following informalities: "Summary of the invention and brief description of the drawings" from page 10, line 20 to line 16 of page 13 should be deleted because the above sections have been added in the amendments. "The tooth width ratio" in Page 10, line 15-16" is wrong according to the amendments and should be written as "the ratio of the tooth width with respect to the pitch..." (see Remarks filed on 2/24/03).

The amended disclosure is objected to because it recites "a tooth width ratio" in line 12, page 15 and in page 6, lines 2,5,6 of the amendments.

Appropriate correction is required.

Claim Objections

3. Claims 3 and 4 are objected to because the limitation "a tooth width ratio of the small rotor teeth with the small stator teeth is set to .35 - .45" is wrong according to Applicant's amendments in the remark section and should be written as "a ratio of the tooth width of the small rotor teeth or the tooth width of the small stator teeth with respect to the pitch of the small rotor teeth is set to .35 - .45". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3,4,7,8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 4 recite the limitation "a tooth pitch is 7.05". It is not clear if it is a rotor tooth pitch or a stator tooth pitch. The Examiner interprets the limitation as a rotor tooth pitch so that it will match to the number of rotor teeth.

Claims 7,8 are dependent claims on claims 3 and 4.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claim 9 rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's admitted prior art.

Regarding claim 9, Applicant's admitted prior art discloses a three-phase hybrid type stepping motor comprising a stator, and a rotor arranged concentrically with the stator and with an air gap therebetween, said stator having an annular stator yoke, six stator poles extending radially and formed at a regular pitch on the inner peripheral surface of the annular stator yoke, and stator windings of three-phase each wound

around each stator pole, each of said stator poles having a plurality of small stator teeth at the tip end thereof, said rotor having two splitted rotor elements and a permanent magnet held therebetween and magnetized so as to form N and S poles in the axial direction thereof. and a plurality of small rotor teeth formed at a regular pitch on the outer peripheral surface of each of said rotor elements, said two splitted rotor elements being shifted from each other in angular position by a $1/2$ pitch of the small rotor teeth (see the specification, page 1, lines 14-25 and Fig. 1a-2c) a permeance distribution of the small stator teeth is a vernier pitch balanced by a six order harmonic wave (page 2, lines 10-13).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Sakamoto.

Regarding claim 1, Applicant's admitted prior art discloses a three-phase hybrid type stepping motor comprising a stator, and a rotor arranged concentrically with the stator and with an air gap therebetween, said stator having an annular stator yoke, six stator poles extending radially and formed at a regular pitch on the inner peripheral surface of the annular stator yoke, and stator windings of three-phase each wound around each stator pole, each of said stator poles having a plurality of small stator teeth

at the tip end thereof, said rotor having two splitted rotor elements and a permanent magnet held therebetween and magnetized so as to form N and S poles in the axial direction thereof. and a plurality of small rotor teeth formed at a regular pitch on the outer peripheral surface of each of said rotor elements, said two splitted rotor elements being shifted from each other in angular position by a $1/2$ pitch of the small rotor teeth (see the specification, page 1, lines 14-25 and Fig. 1a-2c) a permeance distribution of the small stator teeth is a vernier pitch balanced by a six order harmonic wave (page 2, lines 10-13). Applicant's admitted prior art fails to show a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45.

However, Sakamoto discloses a three phase stepping motor wherein a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.2-0.46 for the purpose of reducing cogging torque and improve motor efficiency of the motor (Col. 16, lines 25-65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Applicant's admitted prior art by providing a hybrid stepping motor wherein a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45 for the purpose of reducing cogging torque and improve motor efficiency of the motor since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

7. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Harned and futher in view of Sakamoto.

Regarding claim 2, Applicant's admitted prior art discloses a three-phase hybrid type stepping motor comprising a stator, and a rotor arranged concentrically with the stator and with an air gap therebetween, said stator having an annular stator yoke, six stator poles extending radially and formed at a regular pitch on the inner peripheral surface of the annular stator yoke, and stator windings of three-phase each wound around each stator pole, each of said stator poles having a plurality of small stator teeth at the tip end thereof, said rotor having two splitted rotor elements and a permanent magnet held therebetween and magnetized so as to form N and S poles in the axial direction thereof. and a plurality of small rotor teeth formed at a regular pitch on the outer peripheral surface of each of said rotor elements, said two splitted rotor elements being shifted from each other in angular position by a $1/2$ pitch of the small rotor teeth (see the specification, page 1, lines 14-25 and Fig. 1a-2c).

Applicant's admitted prior art fails to show the permeance distribution of the small stator teeth is a vernier pitch balanced by a three order harmonic wave and a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45.

However, Harned discloses a stepping motor wherein the small stator teeth is a vernier pitch balanced by a three order harmonic wave (Fig. 1 and Col. 2, lines 25-36 and Col. 3, lines 5-10) for the purpose of reducing detent torque.

Moreover, Sakamoto discloses a three phase stepping motor wherein a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.2-

0.46 for the purpose of reducing cogging torque and improve motor efficiency of the motor (Col. 16, lines 25-65).

Since the Applicant's admitted prior art, Sakamoto and Harned are in the same field of endeavor, the purpose disclosed by Harned and Sakamoto would have been recognized in the pertinent art of the Applicant's admitted prior art.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify the Applicant's admitted prior art by introducing vernier pitch balanced by a three order harmonic wave as taught by Harned for the purpose of reducing detent torque.

Moreover, It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Applicant's admitted prior art by providing a hybrid stepping motor wherein a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45 as taught by Sakamoto for the purpose of reducing cogging torque and improve motor efficiency of the motor since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claims 3, the Applicant's admitted prior art and Sakamoto discloses the invention except for showing a three-phase hybrid wherein a number of the small rotor teeth is fifty, a number of the small stator teeth is eight, a tooth pitch is 7.05, and a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45.

However, Harned discloses a stepping motor wherein the ratio of the small rotor teeth small stator teeth is 50/48 (Col. 2, lines 25-32) and a tooth pitch is 7.05 for the purpose of reducing detent torque

Since the Applicant's admitted prior art, Sakamoto and Harned are in the same field of endeavor, the purpose disclosed by Harned would have been recognized in the pertinent art of the Applicant's admitted prior art and Sakamoto.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify the Applicant's admitted prior art and Sakamoto by introducing six stator poles, each with eight small stator teeth and the number of rotor teeth is 50 as taught by Harned for the purpose of reducing detent torque.

Moreover, the limitation "a ratio of the tooth width of the small stator teeth to the pitch of the small rotor teeth is set to 0.35 - 0.45" are given little patentable weight since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 4, It is noted that all limitations of the claimed invention have been fulfilled by Applicant's admitted prior art, Sakamoto and Harned as in claims 2 and 3 above.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Sakamoto and further in view of Satomi.

Regarding claim 5, the Applicant's admitted prior art and Sakamoto show all limitations of the claimed invention except showing a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta.

However, Satomi discloses a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta (Fig. 6b) for the purpose of reducing switching elements (Col. 4, lines 47-55).

Since the Applicant's admitted prior art, Sakamoto and Satomi are in the same field of endeavor, the purpose disclosed by Satomi would have been recognized in the pertinent art of the Applicant's admitted prior art and Sakamoto.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify Applicant's admitted prior art and Sakamoto by using delta connection as taught by Satomi for the purpose of reducing switching elements.

9. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Sakamoto and Harned and further in view of Satomi.

Regarding claims 6-8, the Applicant's admitted prior art, Sakamoto and Harned show all limitations of the claimed invention except showing a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta.

However, Satomi discloses a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta (Fig. 6b) for the purpose of reducing switching elements (Col. 4, lines 47-55).

Since the Applicant's admitted prior art, Sakamoto, Harned and Satomi are in the same field of endeavor, the purpose disclosed by Satomi would have been recognized in the pertinent art of the Applicant's admitted prior art, Sakamoto and Harned.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify Applicant's admitted prior art, Sakamoto and Harned by using delta connection as taught by Satomi for the purpose of reducing switching elements.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Harned.

Regarding claim 10, Applicant's admitted prior art discloses the invention except for showing a permeance distribution of the small stator teeth is a vernier pitch balanced by a three order harmonic wave.

However, Harned discloses a stepping motor wherein the small stator teeth is a vernier pitch balanced by a three order harmonic wave (Fig. 1 and Col. 2, lines 25-36 and Co. 3, lines 5-10) for the purpose of reducing detent torque.

Since the Applicant's admitted prior art and Harned are in the same field of endeavor, the purpose disclosed by Harned would have been recognized in the pertinent art of the Applicant's admitted prior art.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify the Applicant's admitted prior art by introducing vernier pitch balanced by a three order harmonic wave as taught by Harned for the purpose of reducing detent torque.

11. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Satomi.

Regarding claim 11, the Applicant's admitted prior art shows all limitations of the claimed invention except showing a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta.

However, Satomi discloses a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta (Fig. 6b) for the purpose of reducing switching elements (Col. 4, lines 47-55).

Since the Applicant's admitted prior art and Satomi are in the same field of endeavor, the purpose disclosed by Satomi would have been recognized in the pertinent art of the Applicant's admitted prior art.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify Applicant's admitted prior art by using delta connection as taught by Satomi for the purpose of reducing switching elements.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Harned and further in view of Satomi.

Regarding claim 11, the Applicant's admitted prior art and Harned show all limitations of the claimed invention except showing a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta.

However, Satomi discloses a three-phase hybrid motor wherein the three-phase windings of the stator are connected in the form of delta (Fig. 6b) for the purpose of reducing switching elements (Col. 4, lines 47-55).

Since the Applicant's admitted prior art, Harned and are in the same field of endeavor, the purpose disclosed by Satomi would have been recognized in the pertinent art of the Applicant's admitted prior art and Harned.

It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify Applicant's admitted prior art and Harned by using delta connection as taught by Satomi for the purpose of reducing switching elements.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Information on How to Contact USPTO

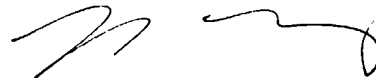
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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh N Nguyen whose telephone number is (703)305-3466. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703)308-1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-1782.

A handwritten signature in black ink, appearing to be 'HNN', located to the right of the text 'Any inquiry of a general nature...'. The signature is stylized and cursive.

HNN

June 9, 2003